Homework week 2

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Review questions

1. What information is used by a process running on one host to identify a process running on another host?
2. List the various network application user agents that you use on a daily basis.
3. What is the difference between persistent HTTP with pipelining and persistent HTTP without pipelining?
4. Each Internet host has at least one local name server and one authoritative name server. What role does each of these servers have in DNS?
5. Describe why Web caching can reduce the delay in receiving a requested object. Will Web caching reduce the delay for all objects requested by a user or for only some of the objects? Why?

Solution

Problems

1. [Kurose & Ross, chapter 2, problem 4] Consider an HTTP client that wants to retrieve a Web document at a given URL. The IP address of the HTTP server is initially unknown. The Web document at the URL has one embedded GIF image that resides at the same server as the original document. What transport and application-layer protocols besides HTTP are needed in this scenario?

Solution

2. [Kurose & Ross, chapter 2, problem 5] Obtain the HTTP/1.1 specification (RFC 2616). Answer the following questions:
   a. Explain the mechanism used for signaling between the client and server to indicate that a persistent connection is being closed. Can the client, the server, or both signal the close of a connection?
   b. What encryption services are provided by HTTP?

Solution
3. [Kurose & Ross, chapter 2, problem 6] Suppose within your web browser you click on a link to obtain a Web page. Suppose that the IP address for the associated URL is not cached in your local host, so that a DNS look-up is necessary to obtain the IP address. Suppose that n DNS servers are visited before your host receives the IP address from DNS; the successive visits incur an RTT of $RTT_1, \ldots, RTT_n$. Further suppose that the Web page associated with the link contains exactly one object, a small amount of HTML text. Let $RTT_0$ denote the RTT between the local host and the server containing the object. Assuming zero transmission time of the object, how much time elapses from when the client clicks on the link until the client receives the object?

**Solution**

4. [Kurose & Ross, chapter 2, problem 9] Write a simple TCP program for a server that accepts lines of input from a client and prints the lines onto the server standard output. (You can do this by modifying the TCPserver.java program in the text). Compile and execute your program. On any other machine that contains a Web browser, set the proxy server in the browser to the machine in which your server program is running; also configure the port number appropriately. Your browser should now send its GET request messages to your server, and your server should display the messages on its standard output. Use this platform to determine whether your browser generates conditional GET messages for objects that are locally cached.

5. [Kurose & Ross, chapter 2, problem 17] Suppose you are downloading MP3s using some peer-to-peer file-sharing system. The bottleneck in the Internet is your residential access link, which is a 128 kbps full-duplex link. While you are downloading MP3s, all of a sudden ten other users start uploading MP3s from your own computer. Assuming that your computer is very powerful, and all of these downloads and uploads are not putting any strain on your computer (CPU, disk I/O, and so on), will the simultaneous uploads – which are also passing through your bottleneck link- slow down your downloads? Why or why not?

**Solution**

[Kurose & Ross, chapter 1, problem 18] Consider query flooding in P2P file sharing, as discussed in Section 2.9.3. Suppose that each peer is connected to at most N neighbors in the overlay network. Also suppose that the node-count field is initially set to K. Suppose Alice makes a query. Find an upper bound on the number of query messages that are sent into the overlay network. **Solution**